



VARIABLE SPEED USER MANUAL

Premium Efficiency Variable Speed Motor



SAFETY

Safety is emphasized throughout the user manual. These are safety alert symbols. They alert the user to potential personal injury hazards. Obey all safety messages to avoid possible injury or death or damage to equipment.

DANGER



DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

CAUTION



CAUTION identifies potential equipment damage or failure conditions. Also, alerts personnel to potentially dangerous situations.

WARNING



WARNING indicates a hazardous situation which if not avoided could result in death or serious injury.

Table of Contents

1.	Introduction	3
2.	User Interface	5
	2.1 Quick Start Guide (Using Factory Schedule)	5
	2.2 Quick Start Guide (Using Custom Schedule)	6
3.	Overview	7
4.	Wiring	8
5.	User Interface Operation	10
	5.1 Navigation Overview	10
	5.2 Menu Structure for 8 Selector Knob Positions	11
	5.3 Set the Clock	12
	5.4 Set the Schedule	13
	5.4.1 Schedule Tables	14
	5.5 Service	17
	5.6 Setup	18
	5.6.1 Freeze Protection	19
	5.6.2 Auxiliary Load Setup	20
	5.6.3 Prime Configuration	22
	5.6.4 Reset Factory Defaults	23
	5.6.5 Set Contrast	23
	5.7 Run Schedule	24
	5.8 Override Low	25
	5.9 Override High	27
	5.10 Key Lockout Feature	29
6.	Care and Maintenance	29
7.	Remote Mounting User Interface	29
8.	Fault Tables	34
9.	Specifications	35
10.	Troubleshooting Guide	36

1 Introduction

The V-Green is a premium efficiency variable speed motor that provides tremendous flexibility in motor speed and time settings. The variable speed V-Green motor is intended to run on the lowest speeds needed to maintain a sanitary environment, which, in turn, minimizes energy consumption. Conditions such as pool size, other water features, chemicals used, and environmental factors help determine how to optimize the motor settings to maximize energy conservation.

The integrated electronics interface controls the power supply to the motor, speed settings between 600 and 3450 rpm, and the start and stop times. The motor can run at speeds between 600 and 3450 rpm. The motor is rated for 230Vrms (+10% or -7%) at an input frequency of 60 Hz.

Features

- Innovative user interface with step-by-step on-screen navigation and ergonomic selector switch
- Power factor correction
- Auxiliary load circuit with configurable run time
- Motor design reduces noise emissions
- Real time clock with 5 year battery back-up to protect programming
- Integrated LCD backlight and adjustable contrast
- UV and rain-proof enclosure
- Adjustable freeze protection
- Manual High and Low overrides

Benefits

- Set-up and programming ease – preset program
- Ease of installation, with no additional wiring required
- Display can be mounted on or off board, facing the pump or facing the lead-end
- Lower power consumption
- Design reliability
- Lower internal peak currents; Input current reduced from 16A to 10A
- Ability to install and program extra load (i.e., salt chlorine generator, booster pump, etc.)
- No need to replace battery or reset time/settings during a power outage or off-season
- Ensures the display can be viewed easily in dark, shady, or direct sunlight conditions

2 User Interface

2.1 Quick Start Guide (Using factory schedule)

The V-Green™ is programmed with a pre-set schedule that complies with California Title 20 requirements. Only the clock setting is required to enable the V-Green to operate at three different speeds and durations using the pre-set schedule. The preset speeds and schedule times are detailed in Table 4.

- ☐ Observe all safety warnings and cautions
- ☐ Verify the user interface is plugged in
- ☐ Make certain the motor is properly wired (refer to Figure 1)
- ☐ Turn selector knob to SET CLOCK
- ☐ Set the Time and Date using the +, -, ←, → buttons
- ☐ Turn the Selector knob to RUN

NOTE: Must wait until “PRIME MODE” is complete to make changes to OVERRIDE settings.

2.2 Quick Start Guide (Using custom schedule)

- ☐ Observe all safety warnings and cautions
- ☐ Verify the user interface is plugged in to the controller
- ☐ Make certain the motor is properly wired (refer to Figure 1)
- ☐ The green Power On LED illuminates when the unit is powered on
- ☐ The red Fault LED illuminates when a fault occurs
- ☐ Use the ← and → arrow buttons to select menu areas
- ☐ Use the + and – to change menu selection parameters
- ☐ Turn selector knob to SET CLOCK
- ☐ Adjust the Time and Date
- ☐ Turn selector knob to Set Schedule (STEP 1, 2, 3)
- ☐ Set the Motor Speed, Start, and Stop times for steps 1, 2, 3
- ☐ Turn selector knob to SETUP (Use ← and → to scroll thru SETUP items)
- ☐ Enable/disable freeze protection
- ☐ Set display screen contrast
- ☐ Set External Relay Speed and Time
- ☐ Set Prime speed and duration
- ☐ Reset Factory defaults (Will return settings to factory defaults)
- ☐ Turn selector knob to RUN
- ☐ Press OVERRIDE HIGH button (not required to run normal schedule)
- ☐ Press SET to change Override High speed and duration (not required to run normal schedule)
- ☐ Press OVERRIDE LOW button (not required to run normal schedule)
- ☐ Press SET to change Override Low speed and duration (not required to run normal schedule)

3 Overview

The V-Green motor can be optimized to suit individual pool conditions. Specific conditions, including pool size, other devices, and environmental factors all help determine the optimal settings.

This may require some trial and error to determine the most satisfactory settings. In all cases, setting the V-Green motor at the lowest speed for the longest duration is the best choice to minimize energy consumption. However, filtration needs may dictate running the VGreen motor at a higher speed for some duration of time each day to maintain proper sanitation.

The User Interface is located on top of the motor controller. To the left of the screen are the Power Saver (Override Low) button and the Clean (Override High) buttons. These buttons can be used to operate the motor at speeds outside of the normal operating schedule.

The rotating selector knob allows the user to do the following:

- Set the clock
- Schedule the motor speed and timings
- View the serial number, software versions, and fault codes
- Enable or disable freeze protection
- Configure auxiliary load
- Adjust screen contrast
- Reset the factory defaults
- Set the prime time and speed

4 Wiring

The controller must be wired according to the local NEC guidelines. A licensed, qualified electrician should complete the wiring for this product.

The controller is designed to operate with 230Vrms, single phase power. The wire insulation should be stripped to a length of approximately 0.33." The terminal block is capable of handling solid or stranded wire up to 12 AWG in size.

Pin #	Wire Color	Description
TB1 - L1	Black	Hot 1
TB1 - L2	Red or White	Hot 2
TB1 - GND	Green	Earth
J108 - A1	Any	Aux 1 (Normally Open)
J108 - A2	Any	Aux 2 (Normally Open)

Table 1: Power Connection

Pin #	Wire Color	Description
J103 - 1	Red	+10V
J103 - 2	Green	RS485 - A
J103 - 3	Black	RS485 - B
J103 - 4	Yellow	Isolated ground

Table 2: Communication Connection Table

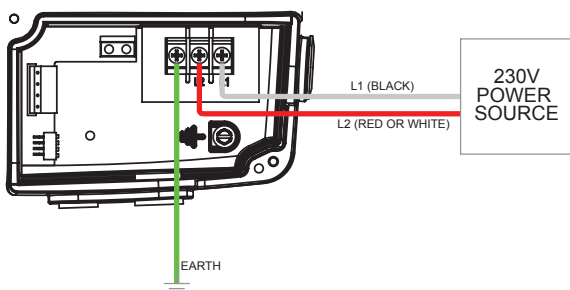


Figure 1: Wiring Diagram without Aux Load

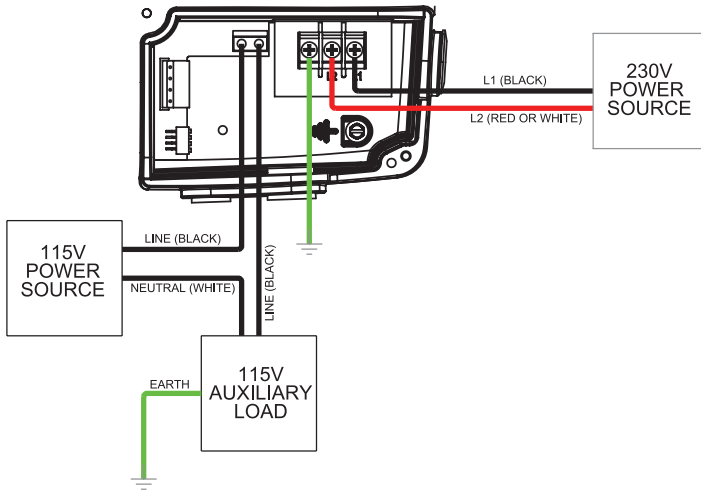


Figure 2: Wiring Diagram with 115V Aux Load

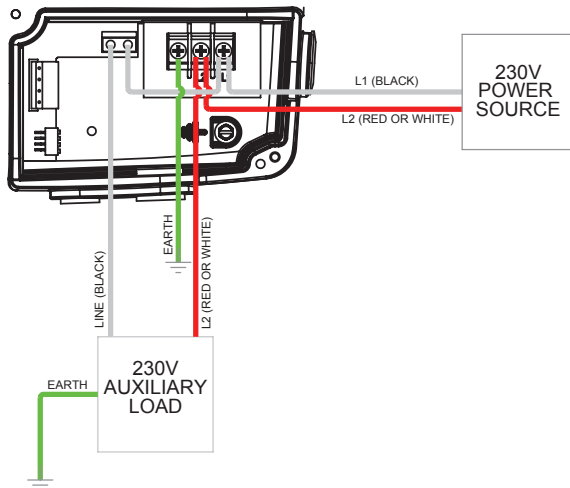


Figure 3: Wiring Diagram with 230V Aux Load

5 User Interface Operation

5.1 Navigation Overview

1. +, - increases/decreases selected value
2. ←, → navigates to adjustable value (digit)
3. (SET) accepts the current screen values
4. (BACK) returns to previous program setting and does NOT accept current screen values

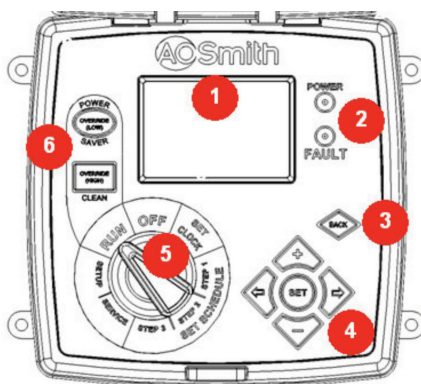


Figure 4: UI Overview

- | | |
|---|---------------------------|
| ① Display Screen | ④ Navigation Buttons |
| ② LED Lights
Power On Light (Green)
Fault Light (Red) | ⑤ Interface Selector Knob |
| ③ Back Button | ⑥ Override Buttons |

Table 3: UI Button Descriptions

NOTE: The selector knob must be turned to RUN for the motor to operate. When the user presses ← or → the cursor moves to the next or previous position. If the cursor is at the end of a line when the user presses the arrow, the cursor moves to the next line.

5.2 Menu Structure for Selector Knob Positions

- 1. SET CLOCK**
 - a. Date and Time
- 2. STEP 1 (Set Schedule)**
 - a. Speed, Start Time, Stop Time
- 3. STEP 2 (Set Schedule)**
 - a. Speed, Start Time, Stop Time
- 4. STEP 3 (Set Schedule)**
 - a. Speed, Start Time, Stop Time
- 5. SERVICE**
 - a. UNIT SERIAL NUMBER
 - b. DC CAP VOLTAGE
 - c. IGBT TEMPERATURE
 - d. PCB TEMPERATURE
 - e. FAULT HISTORY (1,2,3,4)
 - f. CONTROLLER SOFTWARE VERSION
 - g. INTERFACE SOFTWARE VERSION
- 6. SETUP**
 - a. FREEZE PROTECTION
 - i. Enabled/Disabled
 - ii. Turn ON Temperature
 - b. AUX LOAD SETUP
 - i. Minimum Turn On Speed
 - ii. Maximum Run Time (in 24 hours)
 - c. PRIME CONFIGURATION
 - i. Speed
 - ii. Time
 - d. RESET FACTORY DEFAULTS
 - i. Yes/No
 - e. SET CONTRAST
- 7. RUN**
 - a. Manual Override High
 - i. Speed and Duration
 - b. Manual Override Low
 - i. Speed and Duration
- 8. OFF**

5.3 Set the Clock

The first time the user interface is turned ON, the clock must be set to the current time.

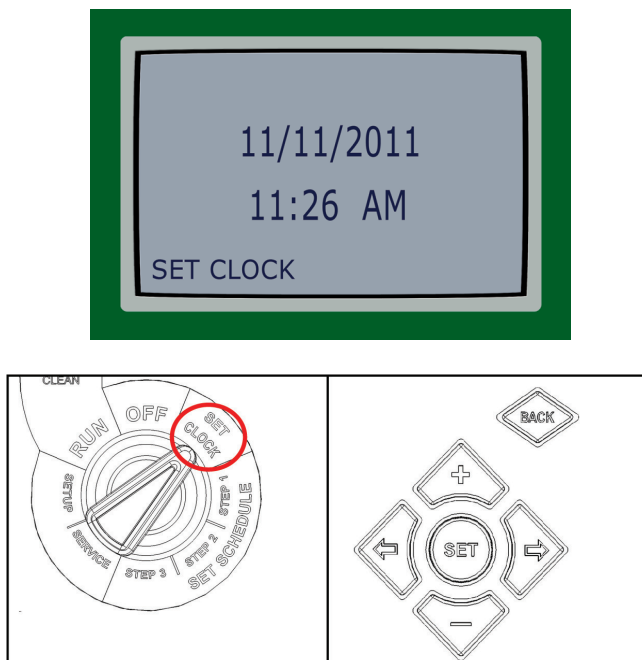


Figure 5: SET CLOCK Menu Buttons

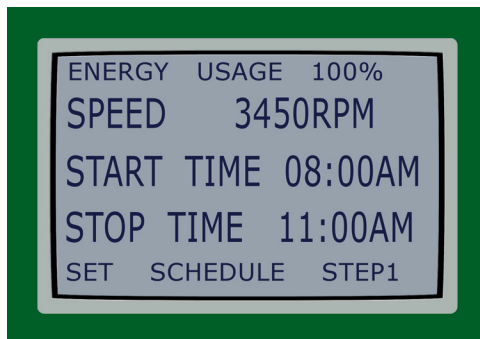
1. Turn the selector knob (see Figure 5) to SET CLOCK.
2. At any time, the user can press BACK to return to the previous area.
3. Press + or – to change the Month. Press → to move to the Day setting.
4. Press the + or – to change the Day. Press → to move to the Year setting.
5. Press + or – to change the Year. Press → to move to the Hour setting.

6. Press + or – to change the Hour. Press → to move to the Minute setting.
7. Press + or – to change the Minute. Press → to move to the AM or PM setting.
8. Press SET when the time is correct.
9. Press SET again if the user needs to make additional changes. The cursor returns to the Month setting.
10. If the date and time are correct, move the selector knob to Set Schedule, Step 1.

NOTE: Neither of the Override buttons affects this menu. The message “Invalid Key” appears if the user presses an Override button.

5.4 Set the Schedule

Set the Speed and Start/Stop times for the motor in the Set Schedule menu. The schedule is based on a 24-hour cycle and will repeat each day of the week.



The highest speed rating for this motor is 3450 rpm and the lowest is 600 rpm. The following table shows the pre-set schedule.

Setup #1			
	Step 1	Step 2	Step 3
Speed	3450 RPM	2600 RPM	1725 RPM
Start Time	8:00 AM	11:00 AM	1:00 PM
Stop Time	11:00 AM	1:00 PM	9:00 PM

Table 4: Pre-set Schedule

5.4.1 Schedule Tables

Use these tables to enter a personalized operating schedule. By writing down the planned schedule, it will make the programming process easier and will help the user to remember the user's settings in case the programming is inadvertently lost. The User Interface will not allow the user to program an overlap between different steps of the schedule. The most recent setting will always take priority over any previous settings.

Setup #2			
	Step 1	Step 2	Step 3
Speed			
Start Time			
Stop Time			

Setup #3			
	Step 1	Step 2	Step 3
Speed			
Start Time			
Stop Time			

Table 5: Custom Schedules

1. Make certain the selector knob points to Set Schedule, Step 1.

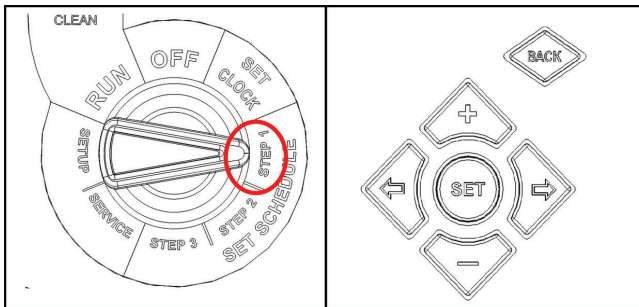


Figure 6: Set STEP 1 Menu Buttons

2. The first digit in the Speed setting flashes. Press + or – to change the first digit in the Speed setting. The number increases one unit at a time.
3. Press → to move to the second digit in the Speed setting. Press + or – to change the second digit. The number increases one unit at a time.
4. Press → to move to the third digit in the Speed setting. Press + or – to change the third digit. The number increases one unit at a time.

5. Press → to move to the fourth digit in the Speed setting. Press + or – to change the fourth digit. The number increases five units at a time.
6. Press → to move to the Start Time setting.
7. Press the + or – to change the Hour. Press → to move to the Minute setting.
8. Press the + or – to change the Minute. Press → to move to the AM or PM setting.
9. Press → to move to the Stop Time setting. Follow steps 6 through 8 to set the Stop Time settings.
10. Press Set to save the settings. If necessary, press Set again to move the cursor back to the first digit.

Unless changes are necessary, move the selector knob to Steps 2 and 3 and repeat procedural steps 2 through 10.

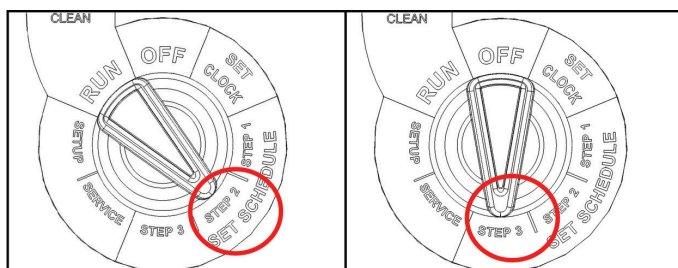


Figure 7: Set STEP 2 and STEP 3 Locations

Move the selector knob to Service when the settings for Steps 1, 2, and 3 are set.

NOTE: Neither of the Override buttons affects this menu. The message “Invalid Key” appears if the user presses an Override button.

5.5 Service

The Service menu allows the user to view, but not change, the following information.

- Unit model number and serial number
- User Interface Version number
- Controller Software Version
- The four most recent faults
- PCB Temperature
- IGBT Temperature
- DC Cap Voltage

Press the arrows to navigate between items viewed on the display screen.

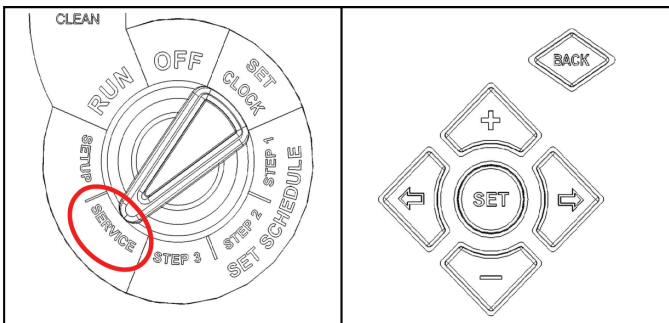


Figure 8: Service Menu Buttons

5.6 Setup

Setup allows the user to configure the following parameters:

- Freeze Protection
- Auxiliary Load Settings
- Prime Settings
- Reset Factory Defaults
- Set Contrast Level

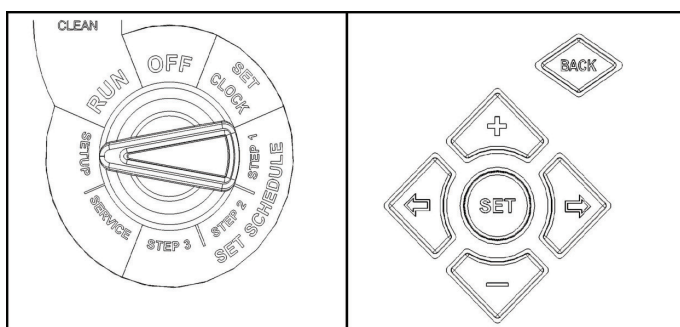
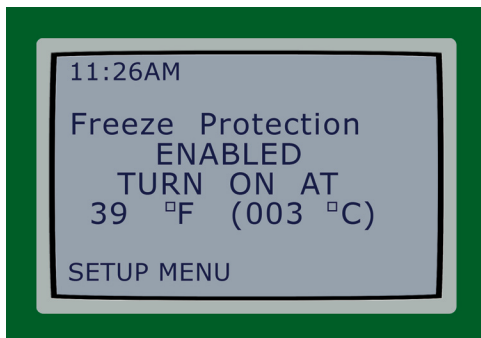


Figure 9: Setup Menu Buttons

5.6.1 Freeze Protection



Freeze Protection can be either enabled or disabled when the user turns the User Interface selector knob to Setup. If it is enabled, the user will be able to set the temperature at which the pump will turn on. The control is designed to run the pump for 8 hours at 2600 RPM if the temperature drops below the setpoint.

1. Make certain the selector knob points to Setup.
2. Press either + or – to change the Freeze Protection setting. Press Set to save any changes.

WARNING: Freeze Protection will ONLY function with the selector knob in the RUN position. Damage may occur to the user's pool system if Freeze Protection is enabled and the switch is not in the RUN position.

5.6.2 Auxiliary Load Setup



The Auxiliary Load is a relay inside the control designed to provide AC power to a load that should not be energized without adequate water flow from the pump (i.e. heater, boost pump, salt water chlorinator).

The control is designed to turn on the Auxiliary Load relay when the pump speed is above the MINIMUM ON SPEED (default is 2000RPM). The Auxiliary Load relay will stay closed as long as the pump speed is above the MINIMUM ON SPEED. In addition, the control can be programmed to limit the amount of time the Auxiliary Load relay is closed in a 24-hour period. For example, if the pump runs at 3450RPM for 12 hours a day, but the auxiliary load only needs to be powered for 6 hours, the user can set the MAXIMUM RUN TIME. Two examples of different settings are provided in Table 6 and Table 7.

1. Make certain the selector knob points to Setup.
2. Press → one time to change the Auxiliary Load settings. Press SET to enter “change mode.” Press + or – to increase or decrease the Minimum Speed. Press → to change the Maximum Run Time. Press the + or – to increase or decrease the Maximum Run Time. Press SET to save changes.

5.6.2.1 Setup Tables (for Auxiliary Load)

Example #1

	Pump Motor Settings			Aux. Load Settings
	Step 1	Step 2	Step 3	
Speed	3450 RPM	2600 RPM	1725 RPM	
Start Time	8:00 AM	11:00 AM	1:00 PM	
Stop Time	11:00 AM	1:00 PM	9:00 PM	
MIN ON SPEED				2000 RPM
MAX RUN TIME				10.5 Hours
Total run time for pump motor		13 Hours		
Total run time for aux. load		5 Hours		

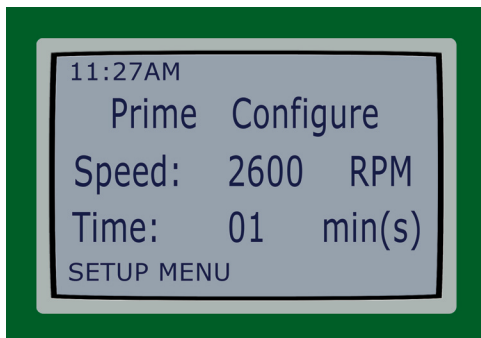
Table 6: Auxiliary Load Setup Example #1

Example #2

	Pump Motor Settings			Aux. Load Settings
	Step 1	Step 2	Step 3	
Speed	3450 RPM	2600 RPM	1725 RPM	
Start Time	8:00 AM	4:00 PM	8:00 PM	
Stop Time	4:00 PM	8:00 PM	11:00 PM	
MIN ON SPEED				2000 RPM
MAX RUN TIME				10.5 Hours
Total run time for pump motor		15 Hours		
Total run time for aux. load		10.5 Hours		

Table 7: Auxiliary Load Setup Example #2

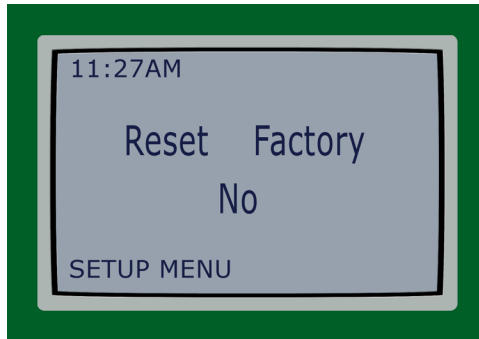
5.6.3 Prime Configuration



The priming speed and time can be adjusted within this menu. The minimum priming speed is 1500 RPM. The maximum priming time is 10 minutes.

1. Make certain the selector knob points to Setup.
2. Press → two times to change the Prime settings.
3. Press SET to enter “change mode.”
4. Press + or – to increase or decrease the Prime Speed.
5. Press → to change the Prime Time. Press the + or – to increase or decrease the Maximum Run Time.
6. Press SET to save changes.

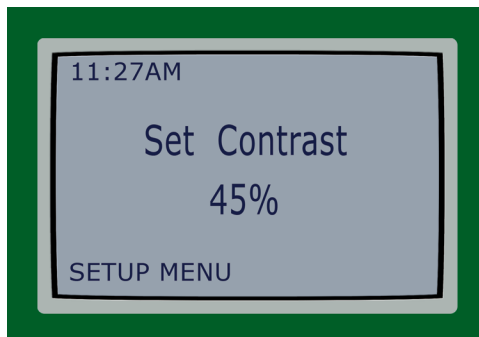
5.6.4 Reset Factory Defaults



This menu will permit the user to reset all settings in the control to the factory default settings.

1. Make certain the selector knob points to Setup.
2. Press → three times to Reset to Factory Default settings.
Press SET two times to verify intent to Reset to the Factory Default settings.

5.6.5 Set Contrast



This menu will change the contrast of the LCD screen to optimize viewing for various lighting conditions.

1. Make certain the selector knob points to Setup.
2. Press → four times to change the Contrast setting.
Use + and – to adjust the contrast level.
Press SET to save the setting.

5.7 Run Schedule

The display screen in the Run switch position shows the following.

- Current clock time
- Remaining time
- Which Step or Prime is running and at what RPM
- Motor status (for example, Program Running)

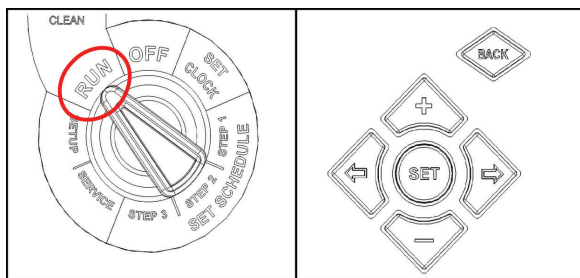
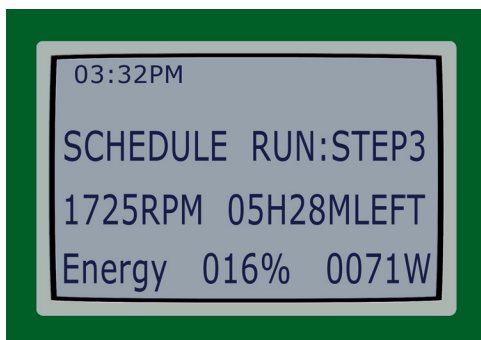


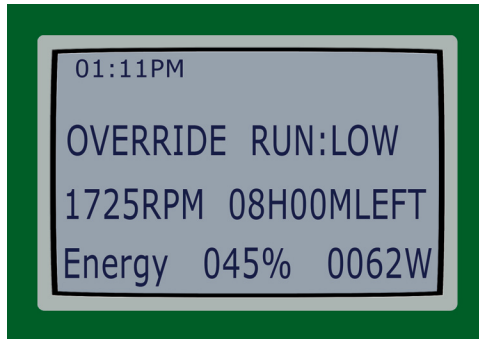
Figure 10: RUN Schedule Buttons

Motor Run allows the user to set the Override parameters. Run the Override settings if the motor needs to perform a certain function immediately.

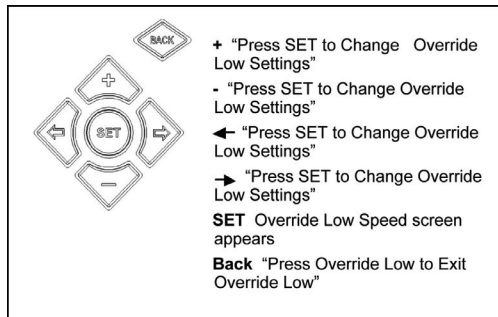
If the user presses +, -, ←, or → the message “Speed and Time Cannot be Changed” appears.

If the user presses the Back button the message “Speed and Time Cannot be Changed” appears unless an Override setting is running.

5.8 Override Low



The Override Low button can program the motor to temporarily run at speeds between 600 and 3450 RPM. Override Low is recommended for low circulation requirements that exist outside of the daily operating schedule. Once the Override Low duration is completed, the motor will automatically return to the programmed schedule.



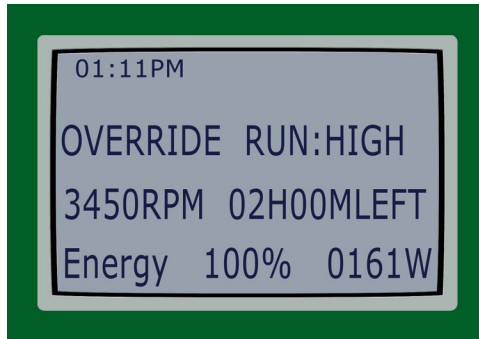
NOTE: Press + to increase the speed. If the value is at 3450, the screen reads "Maximum Speed for this Motor is 3450 RPM." If the fourth digit is flashing, press + and the speed increases by 5.

If the third digit is flashing and the value of the speed is 3445 then the speed increases to 3450. If the third digit is flashing and is less than 3445, the speed increases by 10. If the second digit is flashing and greater than or equal to 3350, the speed increases to 3450. If the third digit is flashing and less than 3350, the speed increases by 100. If the first digit is greater than or equal to 2450, the speed increases to 3450. If the first digit is flashing and less than 2450, the speed increases by 1000. Hold + and the values increase rapidly.

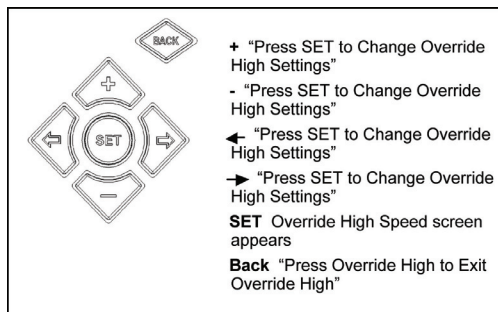
Press – to decrease the speed. If the value is at 0 RPM, the screen reads “Minimum Speed for this Motor is 0 RPM.” If the value of the high speed is 600 then it decreases to 0 RPM. If the fourth digit is flashing, press – and the speed decreases by 5. If the third digit is flashing and the value of the speed is 605, the speed decreases to 600. If the third digit is flashing and greater than 605, the speed decreases by 10. If the second digit is flashing and less than or equal to 700, the speed decreases to 600. If the second digit is flashing and greater than 700, the speed decreases by 100. If the first digit is less than or equal to 1600, the speed decreases to 600. If the first digit is flashing and greater than 1600, the speed decreases by 1000. Hold – and the values decrease rapidly.

1. Press Override Low.
2. Press SET to change the Override Low settings.
3. Press + or – to increase or decrease the first digit in the speed. The maximum speed is 3450 RPM and the minimum speed is 600 RPM.
4. Press → to move to the second, third, and fourth digits in the speed.
5. Press SET to save the speed setting. The motor runs at the Override Low setting. The Override Low Duration Time setting flashes.
6. Press + or – to increase or decrease the Override Low Duration Time. The maximum duration is 24 hours and the minimum is . 5 hours (half an hour).
7. Press SET to save the Override Low Duration Time setting.

5.9 Override High



The Override High button can program the motor to temporarily run at speeds between 600 and 3450 RPM. Override High is recommended for high flow uses such as a pool heater startup, backwash, filtering, and cleaner water requirements that exist outside of the daily operating schedule. Once the Override High duration is completed, the motor will automatically return to the programmed schedule.



NOTE: Press + to increase the speed. If the value is at 3450, the screen reads “Maximum Speed for this Motor is 3450 RPM.” If the fourth digit is flashing, press + and the speed increases by 5. If the third digit is flashing and the value of the speed is 3445 then the speed increases to 3450. If the third digit is flashing and is less than 3445, the speed increases by 10. If the second digit is flashing and greater than or equal to 3350, the speed increases to 3450. If the third digit is flashing and less than 3350, the speed increases by 100. If the first digit is greater than or equal to 2450, the speed increases to 3450. If the first digit is flashing and less than 2450, the speed increases by 1000. Hold + and the values increase rapidly.

Press – to decrease the speed. If the value is at 0 RPM, the screen reads “Minimum Speed for this Motor is 0 RPM.” If the value of the high speed is 600 then it decreases to 0 RPM. If the fourth digit is flashing, press – and the speed decreases by 5. If the third digit is flashing and the value of the speed is 605, the + speed decreases to 600. If the third digit is flashing and greater than 605, the speed decreases by 10. If the second digit is flashing and less than or equal to 700, the speed decreases to 600. If the second digit is flashing and greater than 700, the speed decreases by 100. If the first digit is less than or equal to 1600, the speed decreases to 600. If the first digit is flashing and greater than 1600, the speed decreases by 1000. Hold – and the values decrease rapidly.

1. Press Override High.
2. Press SET to change the Override High settings.
3. Press + or – to increase or decrease the first digit in the speed. The maximum speed is 3450 RPM and the minimum speed is 600 RPM.
4. Press → to move to the second, third, and fourth digits in the speed.
5. Press SET to save the speed setting. The motor runs at the Override High setting. The Override High Duration Time setting flashes.
6. Press + or – to increase or decrease the Override High Duration Time. The maximum duration is 24 hours and the minimum is .5 hours (half an hour).
7. Press SET to save the Override High Duration Time setting.

5.10 Key Lockout Feature

The A. O. Smith User Interface has a key lockout feature to prevent unwanted changes to the settings. To lock the keys, hold down the “+, -, and SET” buttons for more than 3 seconds. The display will then show a symbol of a key indicating the buttons are locked. The user can unlock the keys by holding down the same buttons for more than 3 seconds.

6 Care and Maintenance

The V-Green™ motor is very reliable and robust in harsh environments. However, this product does contain electronics that are cooled by a fan mounted to the motor. In order to ensure optimum reliability of this product, it is recommended to clean the fan inlet on the back of the motor once a month. It is important to keep this area free of large debris such as leaves, branches, mulch, plastic bags, etc.

7 Remote mounting User Interface

The V-Green user interface can be mounted remotely from the controller. In order to complete this procedure, the following steps should be followed:

- A. Remove main power from the controller.
- B. Remove the terminal box cover from the controller (two screws).

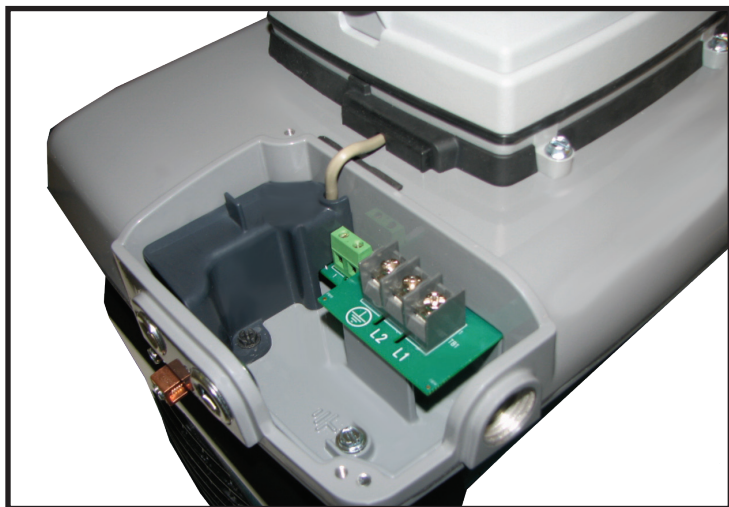


Figure 11: Terminal Box Cover Removed

- C. Remove the plastic wiring cover inside the terminal box (one screw).



Figure 12: Internal Plastic Cover Removed

- D. Disconnect the 4-pin communication connector (J103) by pulling up on the connector.

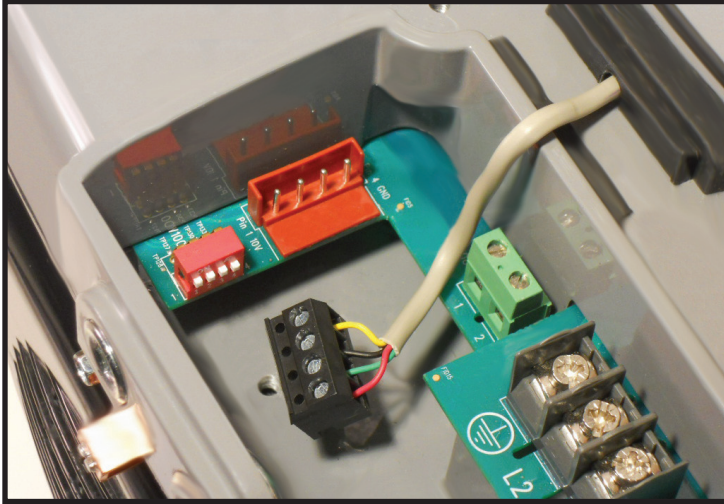


Figure 13: Communication Connector Removed

- E. Install a longer cable of the desired length to the J103 connector on the controller.

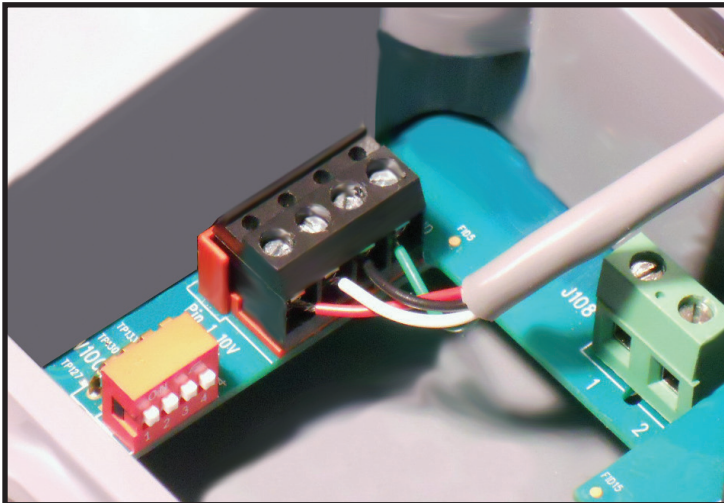


Figure 14: UI connector installed

- F. Replace the plastic cover inside the terminal box (one screw).



Figure 15: Plastic Cover Installed In Terminal Box

- G. Replace the metal terminal box cover. It is **VERY IMPORTANT** to make sure the communication cable fits into the slot on the terminal box cover **BEFORE** the screws are tightened. This will prevent the cable from being damaged.

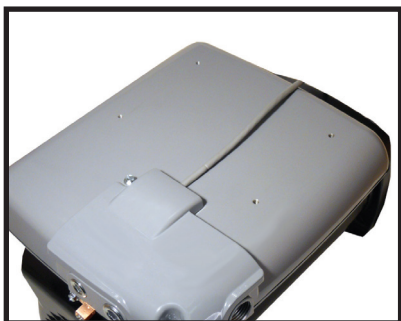


Figure 16: Cover Installed

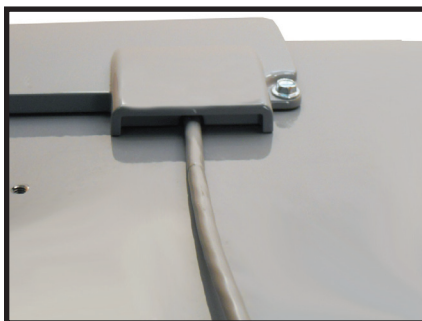


Figure 17: Wire Routing

- H. Remove the small cover on the back of the User Interface (two screws).
- I. Remove the 4-pin connector from the CN1 connector on the User Interface.
- J. Attach the other end of the longer cable to the CN1 connector on the User Interface.



Figure 18: Wire Routing

- K. Replace the small cover on the back of the User Interface.
- L. Mount the User Interface to the desired location (i.e. wall, post, fence, etc.)

In addition, we offer an optional kit for mounting the User Interface remotely (AOS PN: 2512723-001). However, it is not mandatory to purchase this kit to mount the User Interface remotely.

8 Fault Tables

The following table shows possible faults and descriptions. If the motor does not restart following motor retry, please contact your service professional or wholesaler.


Display Value	Description
Fault "SW Overcurrent" Control will retry	Software overcurrent
Fault "HW Overcurrent" Control will retry	Hardware overcurrent
Fault "DC Overvoltage" Control waiting voltage to drop	DC capacitor over voltage
Fault "DC Undervoltage" Control waiting voltage to rise	DC capacitor under voltage
Fault "PCB Temperature" Control waiting temperature to drop	Printed circuit board over temperature
Fault "IGBT Temperature" Control waiting temperature to drop	Inverter IGBT over temperature
Fault "Imbalance Current" Control will retry	Motor current imbalance
Fault "Prime Failure" Control will retry	Failure to Prime Pump
Fault "Startup Failure" Control will retry	Failure to Start Motor
Fault "Low Power" Verify motor connected Control will retry	Low Power
Fault "Loss of Phase" Verify motor connected. Control will retry	Loss of Phase
Fault "Processor Failure" Control will retry	Processor Failure

Display Value	Description
POWERING DOWN	Power down
Fault "Generic Fault" Control will retry	All other faults

NOTE: The fault message "Communication Error, Check Connections" appears if the user interface is unable to establish communications with the controller within five seconds.

Please see troubleshooting guide for troubleshooting issues and their resolutions.

9 Specifications

Overall Ratings		
Input Voltage	230Vrms +10% -7%	
Input Current	11Arms	
Phase Frequency	Single phase, 60 Hz	
Control Terminals		
Auxiliary Load Terminals	230Vrms (11Arms Max)	
Maximum Continuous Load	2.7 THP (Total Horsepower)	
Speed range	600-3450 RPM	
Power factor	>90%	
Peak Efficiency	88%	
Environmental Rating	NEMA Type 3R	
Agency Approval	UL and CUL A. O. Smith UL (E302804) 	
Ambient Conditions		
	Storage	-40°C to +85°C (-40°F to +185°)
	Operating	0°C to +50°C (+32°F to +122°F)
	Humidity	Relative 0 to 95 % non-condensing

10 Troubleshooting Guide

Symptom	Possible Causes	Potential Solutions
MOTOR FAILS TO START	Controller DIP switches not configured properly	Verify that the DIP switches of SW100 under the controller terminal box cover are in the correct position
	Mains Voltage is not present	Replace fuse, reset breaker/GFI Tighten mains wire connections
	User Interface is not connected	Check connections at J103 connector of motor
		Check connections at CN1 connector of User Interface
	Motor shaft is locked	Check if the motor can be rotated by hand and remove any blockage
	Motor shaft is damaged	Replace motor
MOTOR RUNS THEN STOPS	Prime Failure	Tighten basket lid
		Tighten pump inlet/outlet connections
		Check suction side for blockage
	Overtemperature fault	Check that back of motor is free from dirt and debris. Use compressed air or water to clean
MOTOR IS NOISY	Overcurrent fault	Motor will automatically restart after 1 minute
	Debris in contact with fan	Check that back of motor is free from dirt and debris. Use compressed air or water to clean
	Debris in strainer basket	Clean strainer basket
	Loose mounting	Check that mounting bolts of motor and pump are tight
MOTOR RUNS, BUT NO FLOW	Impeller is loose	Check that motor is spinning by looking at fan on back of motor. If so, check that pump impeller is correctly installed
	Air leak	Check plumbing connections and verify they are tight
	Clogged or restricted plumbing	Check for blockage in strainer or suction side piping
		Checked for blockage in discharge piping including partially closed valve or dirty pool filter

Disclaimer

The information in this document incorporates proprietary rights and is not to be duplicated wholly or in part without the express written permission of A. O. Smith Corporation. © Copyright 2011.

The text and images in this document are not to be modified without express written permission of A. O. Smith Corporation.

This document as a whole may be reproduced and distributed, but not sold, for educational purposes. This document as a whole may be included in the bulk of other education material that is for sale with express written permission of A. O. Smith Corporation.

Please refer to our website

www.aosmithmotors.com

for updates to this printed manual.



A. O. Smith Electrical Products Company
531 North Fourth Street
Tipp City, OH 45371
Customer Service: (800) 262-6484
Fax: (937) 667-5030
www.aosmithmotors.com

Distribution Services
1325 Heil Quaker Blvd.
LaVergne, TN 37086
Phone: (866) 887-5216
Fax: (800) 468-2062
www.pool-motors.com